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EXAMINER
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RINEHART, KENNETH

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3743

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/622,677  
Filing Date: July 18, 2003  
Appellant(s): JOHNSON ET AL.

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Douglas W. Swartz  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 6/26/09 appealing from the Office action  
mailed 8/15/2008

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**(1) Real Party in Interest**

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 24-26, 33, 34, 36, 44-66, 68-88, 90-110, 112-132, 134-137, and 139-141 are currently pending and rejected.

**(4) Status of Amendments After Final**

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN

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REJECTIONS.” New grounds of rejection (if any) are provided under the subheading “NEW GROUNDS OF REJECTION.”

**(7) Claims Appendix**

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant’s brief.

**(8) Evidence Relied Upon**

Combustion and Incineration

Processes , Walter Niessen,

3rd edition, Marcel Decker,

Inc., 2002, page 25

1955574	Benner et al	4-1934
4572085	Hepworth	2-1986
4886521	Khan	12-1989
5046265	Kalb	9-1991
4089507	Arai	5-1978
4498402	Kober et al	2-1985
3896746	Pirsh	7-1975

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 24-26, 33-34, 36, 44-66, 73, 78, 79, 80, 81, 87, 88, 95, 100, 101, 102, 109, 110, 122-124, 131, 132, 140-141 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 24, 87, 109, 131, 140-141 refer to the ash slag has a fluid temperature less than the fluid temperature characteristic of the ash slag or a second ash slag produced from combustion of/the solid fuel alone which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has not pointed out where the amended claim is supported, nor does there appear to be a written description of the claim limitation “the ash slag has a fluid temperature less than the fluid temperature characteristic of the ash slag or a second ash slag produced from combustion of/the solid fuel alone” in the application as filed. Claims 36, 45, 88, 110, 132 refers to the melting point of the second ash slag is less than 2600 degrees F, fluid temperature is less than 2600 which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has not pointed out where the amended claim is supported, nor does there appear to be a written description of the claim limitation “the melting point of the second ash

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slag is less than 2600 degrees F “, “fluid temperature is less than 2600 ” in the application as filed.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24, 25, 26, 33, 34, 36, 44-46, 47, 48, 49, 50-53, 55, 56, 61, and 62, 63, 64-66, 68, 69, 70, 71, 72, 73, 74, 76, 77, 82, 83, 84-86, 87, 88, 90-92, 93, 94, 95, 96, 98, 99, 104, 105, 106, 107, 108, 109, 110, 112, 113, 114, 115, 116, 117, 118, 120, 121, 126, 127, 128, 129, 130, 131, 132, 134, 135, 136, 137, 139, 140, 141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benner (1955574) in view of Hepworth (4572085). Benner discloses introducing a solid fuel into the boiler, wherein the solid fuel is a coal (figure 1), iron containing material, at least partially combusting the solid fuel to produce an ash slag, wherein, in the at least partially combusting step, at least one of the following is true: (i) the ash slag has a fluid temperature less than a fluid temperature characteristic of the ash slag produced from combustion of the solid fuel alone; and (ii) the ash slag has a melting point less than the melting point of a second ash slag produced from the combustion of the solid fuel alone calcium content, sub-bituminous coal (page 1, lines 7-10, line 15), viscosity (page 3, lines 52-75), fluxes (page 2, line 1) reducing particle size (powdered coal), the iron-containing material is selected from the group consisting of ferrous oxide, ferric oxide, ferrous sulfide, ferric sulfide, and combinations thereof, iron oxides (page 1, lines 50-55), iron containing material is added to solid fuel before introducing the solid

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fuel (7, fig. 1) . Hepworth teaches mill scale, iron oxides (col. 3, line 12), cyclone boiler, ash slag flows from boiler, wet bottom boiler, slag type (figs.), slag flows from wet bottom boiler (figs.) for the purpose of reducing operating costs and providing for complete combustion of coal. It would have been obvious to one of ordinary skill in the art to modify Benner by including mill scale, iron oxides, cyclone boiler, ash slag flow from wet bottom boiler as taught by Hepworth for the purpose of reducing operating costs and providing for complete combustion of coal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to having a sulfur content of less than about 1.5 wt.%, the ash slag has a viscosity of 250 poise produced from the combustion of the solid fuel and iron-containing material is at least 100 degrees Fahrenheit lower than the T250 temperature of the second ash slag produced from the combustion of the solid fuel alone, the melting point of the second ash slag is less than 2600 degrees F, about 300 microns, 10lb/ton, 20 lb/ton, 15 weight percent, 10 wt %, at least about 33.5% of the iron-containing additive is in the form of ferrous iron and no more than about 66.5% of the iron in the additive is in the form of ferric iron, magnetite since where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. As evidenced by Kalb (5046265) (col. 1, lines 16-24) the low sulfur content with low iron content and high alkali content coal is desirable for reduction of SO<sub>2</sub> emissions. The applicant is merely combining prior art according to known methods to yield predictable results.

Claims 57, 58, 78, 79, 100, 101, 122, 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benner (1955574) in view of Hepworth (4572085) as applied to claims 24, 68, 90, 112, above, and further in view of Khan (4886521). Khan teaches hydrocarbon, oil grease

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and xanthum gum (col. 1, lines 65-72, col. 2, lines 1-32) for the purpose of promoting removal of the slag. It would have been obvious to one of ordinary skill in the art to modify Benner by including hydrocarbon, oil grease and xanthum gum as taught by Khan for the purpose of promoting removal of the slag. The applicant is merely combining prior art according to known methods to yield predictable results.

Claims 59, 60, 80, 81, 102, 103, 124, 125, are rejected under 35 U.S.C. 103(a) as being unpatentable over Benner (1955574) in view of Hepworth (4572085) as applied to claim 24, 68, 90, 93, 112 above, and further in view Pirsh (3896746). Benner discloses introducing the iron containing material. Pirsh teaches device (87), burner (fig. 2), fuel transfer system (fig. 2), chamber (fig. 2), bunker (76) for the purpose of reducing the size of the fuel. It would have been obvious to one of ordinary skill in the art to modify Benner by including device, burner, fuel transfer system, chamber, bunker as taught by Pirsh for the purpose of reducing the size of the fuel so that the fuel burns more efficiently. The applicant is merely combining prior art according to known methods to yield predictable results.

Claims 54, 75, 97, 119 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benner (1955574) in view of Hepworth (4572085) as applied to claim 24, 68, 90, 112 above, and further in view Arai et al (4089507). Arai teaches dust (col. 1, lines 18—32) for the purpose of reducing pollutant problems. It would have been obvious to one of ordinary skill in the art to modify Benner by including dust as taught by Arai for the purpose of reducing pollutant problems. It is noted that there are a limited number of choices available to one of ordinary skill in the art for supplying iron oxide at low cost. In this regard it is noted that Arai teaches this low cost supply.



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Claims 68, 69, 71-74, 77-81, 84, 85, 90, 91, 93, 94, 95, 96, 99, 100, 102, 103, 106, 107, 112, 113, 115, 116, 117, 118, 121, 122, 124, 125, 128, 129, 134, 137, 69, 70, 75, 76, 82-83, 85-86, 89, 92, 97-98, 101, 104-105, 108, 111, 114, 119-120, 123, 126, 127, 130, 133, 135-136, 138, 139 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepworth (4572085) in view of Kober et al (4498402). Hepworth discloses the boiler and iron containing material and at least partially combusting the ash slag (fig. 1, col. 3, line 12), iron bearing material fluxes ash slag having a melting temperature less than the melting temperature of the ash slag produced from the combustion of the solid fuel alone, viscosity, melting at least a portion of the coal-containing fuel to produce an ash slag, wherein, in the melting step, at least a portion of the iron-containing additive fluxes the ash slag to produce a slag layer having a melting point less than a melting point of an slag layer without the iron-containing additive (This inherently occurs. In chemistry it is elementary that the use of the same reactants under the same conditions in the same reactor will produce the same results.) cyclone boiler (fig. 1), composite ash slag has a viscosity (fig. 1) particle size reduction (inherent), magnetite (col. 4, line 59) one carbon compound (col. 3, line 12), a particle size reduction ( inherently the fuel comes form a pulveriser), a burner (fig. 1), a fuel transfer system (fig. 1), combustion chamber (fig. 1), introducing the iron containing material (fig. 1), a fuel storage bunker (col. 3, line 8), the iron bearing material is added to the solid fuel (col. 3, lines 10-15), sub bituminous (col. 1, line 52). Hepworth discloses applicant's invention substantially as claimed with the exception of low sulfur, the coal has a total content of less than about 10 wt % (dry basis of ash) and wherein the coal has a calcium content of at least about 15 wt % (dry basis of ash), wherein the low sulfur coal has a total sulfur content of less

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than about 1.5 % wt (dry basis of coal), P90 size of about 300 microns, dust form blast furnace gas cleaning equipment, ferrous oxide and ferric oxide ferrous sulfide, ferric sulfide, and combinations thereof, introducing at least one carbon compound along with the iron bearing material, hydrocarbon, oil and grease Xanthum gum, iron bearing material is introduced into the boiler an amount ranging form 10lb/ton of solid fuel to about 20 lb/ton, 50 lb/ton of solid fuel, 15 weight percent, the at least one ash fusion temperature characteristic is less than 2600 F, less than 1.5 wt %, 33.5 % and 66.5 %. Kober et al teaches low sulphur (col. 2, line 10) to meet environmental requirements. It would have been obvious to one of ordinary skill in the art to modify Hepworth by including low sulphur as taught by Kober for the purpose of meeting environmental requirements. Hepworth in view of Kober discloses applicant's invention substantially as claimed with the exception of P90 size of about 300 microns, dust form blast furnace gas cleaning equipment, ferrous oxide and ferric oxide ferrous sulfide, ferric sulfide, and combinations thereof, introducing at least one carbon compound along with the iron bearing material, hydrocarbon, oil and grease Xanthum gum, iron bearing material is introduced into the boiler an amount ranging form 10lb/ton of solid fuel to about 20 lb/ton, 50 lb/ton of solid fuel, 15 weight percent, the at least one ash fusion temperature characteristic is less than 2600 F, less than 1.5 wt %, 33.5 % and 66.5 %. It would have been obvious to one of ordinary skill in the art at the time the invention was made to P90 size of about 300 microns iron bearing material is introduced into the boiler an amount ranging form 10lb/ton of solid fuel to about 20 lb/ton of solid fuel, 50 lb/ton, 15 weight percent, the at least one ash fusion temperature characteristic is less than 2600 F, less than 1.5 wt %, 33.5 % and 66.5 % since it has been held that the where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges

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or values involves only routine skill in the art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have another type of iron bearing material or ferrous oxide and ferric oxide and ferric oxide ferrous sulfide, ferric sulfide, and combinations thereof, the at least one carbon compound being of a specific type of one or more of a hydrocarbon, oil, grease, and xanthum gum, because applicant has not disclosed that the type of iron bearing material, type of carbon provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with either the type of material of Hepworth or the claimed type because both materials perform the same function equally well. The applicant is merely combining prior art according to known methods to yield predictable results.

#### **(10) Response to Argument**

Regarding the 35 U.S.C. 112 first paragraph rejections, the applicant lacks an explicit disclosure in the specifications for the claimed subject matter. The applicant argues that the lack of literal support is not enough to support a 35 U.S.C. 112 rejection where one of ordinary skill in the art would understand from the disclosure that the application inherently discloses the claimed invention. Inherency requires that the inherent property must necessarily be present in the subject matter. In this case, the applicant is trying to equate two different terms, melting point and fluid temperature. These terms are not equivalent and the property of one term is not necessarily present in the other as will be shown.

Applicant first argues that melting temperature and fluid temperature are synonymous. Applicant points to the article *Coal Properties, Sampling & Ash characteristics* by Rod Hatt, which states that melting refers to a decrease in slag viscosity and that there is no distinct melting

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“point”. Applicant then states, based on his opinion and without factual support, that melting equates to fluidity and fluidity is the fluid temperature. But applicant contradicts himself in his brief, page 16, where he provides a definition of fluid temperature from the Bisque Declaration, which is defined as the temperature at which the ash cone has melted to a nearly flat layer with a maximum height of 0.0625 in.. Therefore applicant admits there is not only a specific definition but there is also a distinct point which would be defined as the fluid temperature and not a continuum of points. The fact that the applicant is providing varying definitions of fluid temperature and not defining it in the specifications shows that one of ordinary skill would not have believed the applicant was in possession of the subject matter at the time of filing. In addition, the Niessen reference defines the fluid temperature as a subset of different temperatures used to calculate ash fusion temperature. The reference further defines other useful physical properties such as *melting point* which is a distinct property different than fluid temperature.

It is important to note, the Bisque declaration, which applicant relies on, is not prepared by a disinterested party. Mr. Bisque is not only an employee of ADA Environmental Solutions but is a shareholder and Chairman of the Board of Directors. Under MPEP 716.01(c), section III, any interest of the expert in the outcome of the case should be taken into consideration.

In regards to arguments presented by the applicant concerning the Shephard reference, the examiner will only deal with references used in the rejection.

Applicant contends that there is support in the specifications for the claimed requirement that the fluid temperature be less than 2600°F (claims 66, 88, 110, and 132). Applicant points to page 2, lines 14-15 of the specifications. That statement in the specifications refers to normal combustion temperatures and gives an example range from 2600 to about 3000°F. First, this

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statement does not mention fluid temperature. Secondly, this merely states a sample range with no defined lower limit that it has to be less than 2600°F. Applicant attempts to provide additional support by pointing to figure 7, which is a graph that plots viscosity vs. temperature and claiming it supports the conclusion that the ash slag is melted at temperatures below 1,900°F. But the temperature range of the graph has a lower limit of 2100°F and not 1,900°F and the data points stop around 2250°F. In addition, it says nothing about fluid temperature. Therefore applicant's arguments do not support his conclusion.

Applicant next contends that the Benner reference supports applicant's contention that melting point is the same as ash fluid temperature. According to Benner, the melting point of the ash is the temperature at which it will prevent accumulation of slag on the furnace walls beyond a skin or coating which has been formed over the walls (which coating is produced by the air and/or water cooling of the furnace walls) and the congealing or setting of the slag in immediate contact therewith. This passage can be taken on its face for its meaning. It does not provide a definition of fluid temperature but of melting point. It is important to note that the applicant's original disclosure did not provide a definition of melting point but must rely on other sources for the definition which further emphasizes the point that there is a lack of written description.

Applicant then contends that the invention is not obvious under 35 U.S.C. 103 and states that the Benner reference teaches away from adding an iron-containing material to the coal boiler or furnace. Benner does not teach away from the use of iron containing material in a coal boiler or furnace. The applicant's cite in Benner is directed to the brick used to construct the furnace. The applicant's cite was merely part of a comparison of silicon carbide bricks with clay bricks and that a layer of slag would protect the bricks of non-fire clay. Contrary to applicant's

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argument, Benner states on lines 52-54, “The presence of iron oxide in the coal is the chief cause of change in the melting point of the ash”. Additionally, fusible clay or rouge, which contains iron, is also a possible reagent mentioned in the Benner reference.

As for the Hepworth reference, applicant contends that Hepworth is silent about the effects of the iron oxide additive in lowering the melting point of the ash or in increasing slag viscosity. Benner was used to teach this principle. Hepworth was used to teach the use of mill scale although it does teach using an iron oxide as well.

The applicant next argues that Hepworth teaches away from using taconite or mill scale to control melting temperature by stating the carbon, not iron oxide, lowers the melting point of the liquid. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious, See *Ex Parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, Hepworth teaches that it is known to provide an iron additive of various claimed forms to remove combustion produced sulfur. The primary reference already teaches the use of iron to influence temperature. The use of such claimed forms of iron to influence temperature would be obvious to one of ordinary skill in the art. In response to applicant’s argument that the references fail to show certain features of applicant’s invention, it is noted that the features upon which applicant relies (i.e., the beneficial role of silica) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specifications, limitations from the specifications are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

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Applicant also argues that Hepworth is directed to high-sulfur eastern coals and not low-sulfur western coals. Benner discloses that the influence of iron oxide on the melting point of coal has been known since 1929 and that low sulfur Montana Subbituminous (western coal) has been used. Therefore, the applicant's arguments are not particularly relevant.

As for the Khan reference, applicant argues that Khan says nothing about the impact of iron oxide addition on ash melting or fluid temperature but Khan was not used to teach these claim limitations. Khan was used to teach the use of hydrocarbon, oil grease, and xanthan gum. In this case Khan teaches a hydrocarbon with an iron additive used in the area of deagglomeration. One of ordinary skill would be therefore aware of the existence of such substances and it would be a simple matter to substitute such a substance to influence the slag properties as disclosed in Benner.

Applicant argues that Pirsh says nothing about the iron addition to coal. Pirsh was used to teach device (87), burner (fig. 2), fuel transfer system (fig. 2), chamber (fig. 2), bunker (76) for the purpose of reducing the size of the fuel. It would have been obvious to one of ordinary skill in the art to modify Benner by including device, burner, fuel transfer system, chamber, bunker as taught by Pirsh for the purpose of reducing the size of the fuel so that the fuel burns more efficiently. The applicant is merely combining prior art according to known methods to yield predictable results. It is well known in the art to use pulverisers and the accompanying conveyance or piping system to provide a supply of fuel which has been reduced in size to increase surface area and provide for more efficient combustion.

Applicant argues that Arai, et al. says nothing about the iron addition to coal. Arai, et al. teaches dust for the purpose of reducing pollutant problems. It would have been obvious to one

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of ordinary skill in the art to modify Benner by including dust as taught by Arai, et al. for the purpose of reducing pollutant problems. It is noted that there are a limited number of choices available to one of ordinary skill in the art for supplying iron oxide at low cost. In this regard it is noted that Arai, et al teaches this low cost supply.

Applicant also argues that Kober, et al. does not teach adding iron to coal to control melting temperature or point or fluid temperature. Kober, et al was used to teach using low sulfur to meet environmental requirements. It would have been obvious to one of ordinary skill in the art to modify Hepworth by including low sulfur as taught by Kober for the purpose of meeting environmental requirements.

The applicant argues that there is no motivation to combine the references and that there would be no reasonable expectation of success. In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, one of ordinary skill in the art would understand the importance and advantage as illustrated by Kober of using low sulfur coal to meet environmental regulations and therefore utilize the fuel to achieve the objective. Moreover, Hepworth does not state that low sulfur cannot be used in the cyclone burner. Hepworth only



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implies that the cost of the fuel would lead one to use alternative supplies, while environmental regulations, on the other hand, would make the low sulfur fuel highly desirable.

Regarding the applicant's statements that there would be no reasonable expectation of success by combining the teachings of Hepworth and Kober. The Applicant's cite to Kober refers to coal supplies that are "completely different". The degree of such differences is not specified. Moreover, one of ordinary skill in the art would not intentionally operate the equipment in a manner that would lead to problems such as slagging. One of ordinary skill would understand the differences related to the fuels and operate the apparatus to compensate for these differences to overcome any issues that arose.

Regarding the hydrocarbon, oil, grease and gum and assorted ranges the applicant has not disclosed any criticality for these material and range limitations.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Kenneth B Rinehart/  
Supervisory Patent Examiner, Art Unit 3743

Conferees:

/Henry Yuen/  
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/Tu Hoang/  
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